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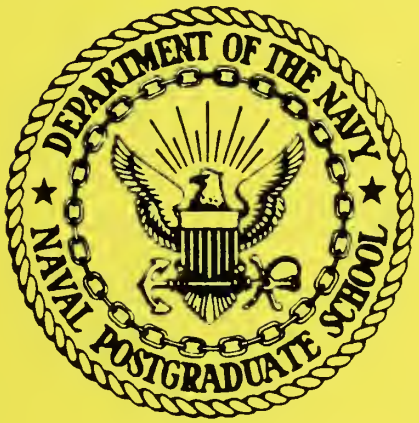

DOD'S GUARANTEED TRAFFIC PROGRAM AND MOTOR CARRIER RATES

by

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Prepared for: Naval Postgraduate School
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ABSTRACT

The expected decline in motor carrier rates due to partial deregulation of the industry has been difficult to measure because the expected deregulatory effects have been confounded with recent recessionary effects on rates. By comparing Department of Defense shipments which move under common carrier rates to similar shipments in which strong elements of competition have been introduced, the recessionary effects of rates can be statistically controlled. Qualitative and quantitative models are used to show the significance of the effects of competition on rates. Service quality effects are also discussed.

I. INTRODUCTION

One of the major arguments for deregulation of the motor carrier industry was the expected decline in rates due to increased competition among carriers (Coyle, Bardi, and Cavinato). Because of the near coincidence of the severe recession of the early 1980's with the onset of partial deregulation of the industry following passage of the Motor Carrier Act of 1980, motor carrier rates generally fell until

approximately 1983 when they began to rise. Hence, measuring the expected decline on motor carrier rates has been quite difficult due to its confounding with recessionary effects. This paper provides a method for determining the effects on rates of the increased competition resulting from the Motor Carrier Act of 1980.

In an attempt to take advantage of the recent climate of partial deregulation, the Department of Defense (DoD), for the Defense Logistics Agency (DLA), has instituted the Guaranteed Traffic Program (GTP) in which a long term agreement is signed with a motor carrier to provide service for all of a particular category of shipments at a given DLA depot. The Federal government's standard bid and proposal process is used to determine the winning carrier, with the primary selection criterion being minimum rates. This program is in effect at some depots for some types of traffic while the remainder continue to use common carrier service. Not unexpectedly, competition is appearing in both rates and service quality under the Guaranteed Traffic Program.

This situation provides a means of controlling for recessionary rate effects. Comparing changes in rates for those shipments using the Guaranteed Traffic Program to rates for shipments not using the program provides a basis for statistically controlling the recessionary effects on rates experienced during six month periods from October 1981 to September 1984. Analysis of variance is performed to determine

the significance of effects on rates due to the use of guaranteed traffic, the type of load, and the time period of the shipment. After determining that all effects are significant, a quantitative measure of the effects of the Guaranteed Traffic Program on rates can be obtained by fitting a quadratic regression function to rate changes over the time periods. In examining the rate increases shown by the quadratic function during the latter part of this period, it appears that rate increases for non-guaranteed traffic categories have been higher than rate increases for guaranteed traffic categories.

II. PRIOR MOTOR CARRIER AGREEMENTS

As the DoD traffic manager, the Military Traffic Management Command (MTMC) is responsible for the transportation of all surface shipments moved within the DoD system; however, for the account of DLA, MTMC has delegated the authority to rate and route shipments weighing less than 10,000 pounds to depot Installation Transportation Officers. MTMC's responsibility includes the review and maintenance of the standard Federal government tender-of-service form developed by the General Services Administration. A tender-of-service is filed by carriers interested in transporting government freight at reduced rates and describes the type of service offered, the origin and destination points, and the rate to be charged. These tender rates are filed with the Interstate Commerce Commission.

To route a qualified shipment, MTMC offers two types of services: research of existing tender files, and the establishment of a Standing Route Order (SRO). For instance, if a shipper calls MTMC for the routing of a 15,000 pound shipment from Monterey, CA to Richmond, VA, the rate specialist will first check to see if an SRO has been established between the two points. If not, the rate tenders on file between the points will be examined to determine the carrier having the lowest rate. The low-rate carrier, along with the next several lowest rate carriers will be given to the shipper who will then contact the carriers, in order from low to high cost, until a carrier is reached who will accept the shipment. This process is sometimes very time-consuming and has resulted in long delays. If, however, an SRO has been established, the research time is reduced considerably, and the carrier is generally available since the SRO is updated every 30 days. In many instances, the shipper does not need to contact MTMC since SRO's are distributed to frequent users.

A Standing Route Order is a document issued by MTMC listing the carriers with the lowest and next lowest tender or commercial rates on file between the points in question. The establishment of an SRO is relatively straightforward. All shippers having large movements of traffic which exceed 500,000 pounds, 24 truckloads, or 24 carloads are required to file with MTMC a Volume Movement Report (VMR) which lists the origin and destination points, the number of shipments, and the tonnages

involved. Upon receipt, MTMC reviews the VMR and compares the existing tender rate files between the points shown in the VMR. If the rate specialist feels that a lower rate can be obtained based on volume or based on a compatible commodity between two other points, a Request for Proposal is submitted to the carrier industry requesting bids for the specific commodity or freight-all-kinds (FAK) rates with the anticipation of securing lower rates.

Industry firms then respond with their tenders, which can be the same, lower, or higher than the rate researched by the analyst. After all of the new tenders are received and researched, MTMC issues the SRO which lists the primary and secondary carriers. The SRO is then distributed to the frequent users, and is usually good for one year, or until the movement is complete. At 30-day intervals during the life of the SRO, the rates are compared to existing tender files, and if a lower rate exists, a new primary and/or secondary carrier is placed on the SRO, and an amendment is issued to using shippers. All qualified traffic is then routed by the SRO. This process, like the tender search, is very time-consuming because of the number of SRO's that have to be continually reviewed and updated.

In 1979, just prior to the passage of the surface transportation deregulation legislation, MTMC attempted to get contract motor carriers to participate in the transportation of government traffic by offering ten routes under long-term (six months) SRO's to the contract carrier industry. To MTMC's

surprise, no contract carriers responded; however, several common carriers did. As a result, the first long-term freight tender was issued.

Just after this first long-term agreement was awarded, both the rail and motor carrier industry were partially deregulated resulting in a flood of thousands of new and revised tenders-of-service being filed with MTMC. Many of these tenders were filed by new or small carriers who had gained access to government traffic under the relaxed licensing provisions found in the new legislation. The older established carriers were soon replaced by these new entrants as the low-cost carriers under the MTMC process. Many of these carriers were characterized by a lack of management experience and insufficient equipment to provide adequate service to government shippers. This caused serious problems for many DoD shippers and, in particular, for the six major DLA depots. The most severe problem at the depots seemed to be the fact that approximately 80 percent of the carriers selected by MTMC refused depot freight because they lacked sufficient equipment to provide the needed service.

Realizing that something had to be done, the depot Installation Transportation Officers tried to persuade MTMC to allow them to use higher-cost carriers to replace the low-cost ones providing poor service. MTMC, however, would not permit a deviation from the rules without a lengthy process for disqualifying carriers, with the result being a rapid deterioration in the depots' service to their customers. For

example, just after the Motor Carrier Act of 1980 was passed, on-time performance by DLA depots dropped to about 63 percent, as compared to current figures in the low 90 percentile range.

By the end of 1980, depots were very dissatisfied with MTMC's routing policies. Action had to be taken to ease the pressure on the depots, so DLA and MTMC jointly initiated a program to procure long-term, responsive carrier service. This program came to be known as the Guaranteed Traffic Program.

III. THE GUARANTEED TRAFFIC PROGRAM

There are three major types of guaranteed traffic agreements for motor carriers: (1) dedicated service, (2) scheduled point-to-point service, and (3) scheduled geographical region service. Dedicated service agreements are agreements which require the carrier to dedicate equipment for a particular service requirement, generally involving service from a single destination with no comingling of freight. Other types of dedicated service include expedited service, seven-day-per-week or as-required service, and the use of specialized equipment.

Scheduled point-to-point service will usually involve an agreement from one origin to single or multiple named destinations. They generally are for less-than-volume (less than 10,000 pounds) and/or volume (greater than 10,000 pounds) movements of freight. Carrier pickups are on a scheduled or as-required basis, and specific transit times are included as part of the

agreement. Charges are based on actual weight or mileage.

Scheduled geographical region agreements involve motor/rail service similar to that of point-to-point agreements, except that the destinations are specified as a single state or group of states. Rates in these types of agreements will generally include all points within a state to prevent the carrier from applying a higher rate to infrequent destination points.

There are four major participants in the DLA guaranteed traffic program: Chief, Transportation Division, DLA Headquarters (DLA-OT); DLA depot Installation Transportation Officers (ITO's); the Contracting Officer, Negotiations Division, Headquarters, MTMC (MT-INN); and the carrier. Each entity plays a specific role which must be coordinated throughout the process.

MTMC suggests several guidelines for identifying possible candidates for the Guaranteed Traffic Program (Cefaratti):

1. Large volumes of traffic - over one million pounds annually.
2. The movement of large volumes of freight from one origin to one destination.
3. Movements of a special commodity and/or shipments where special equipment or services are required.
4. Traffic that is recurring or repetitive in nature.
5. The shipper requires round-trip movements.
6. The nature of the traffic requires the carrier to adhere to a rigid pickup and delivery schedule.

Once the needed information is available, a draft solicitation package is prepared. DLA-OT provides assistance to the ITO in preparation of this document, which is the single most important document in the guaranteed traffic process. It

contains the rules under which the depot and carrier will operate during the life of the agreement. Items such as stopoffs, desired transit times, and carrier disqualification are covered in the agreement. When the package is completed, it is submitted to DLA-OT for completion of the process.

Upon receipt of the draft solicitation package from DLA-OT, MT-INN checks it for accuracy, and then prepares the actual solicitation and a cover letter setting forth the conditions under which the traffic will be awarded, the MTMC and depot points of contact, the time and place of any meetings, and the time set for submission of bids. Just prior to the submission of bids and bid openings, a pre-bid meeting may be held with all interested parties at the depot or a location near where the agreement will take effect. A prebid meeting is used to clarify any problems or questions the carriers may have about the solicitation prior to actual award. This is a very important part of the process since an active long-term agreement is hard to change after it has become effective.

After evaluating the submissions, a list is compiled which ranks the carriers, in order, from low to high cost. This is important since MT-INN is responsible for replacing disqualified carriers with the next lowest offeror. In these instances, this information must be readily available. Once the low bid is accepted, the carrier is awarded all of the traffic moving under the agreement for a period of one year.

IV. GUARANTEED TRAFFIC AND RATE EFFECTS

Guaranteed traffic relies on competition among carriers to create the opportunities for DLA to obtain competitive rates. Hence, the rates under the Guaranteed Traffic Program will tend to reflect competitive forces much more than rates under tenders or Standing Route Orders. However, not all of DLA's depots and traffic types have operated under guaranteed traffic. This situation provides the opportunity to determine whether the existence of the Guaranteed Traffic Program for some shipments has resulted in lower levels of rates than for other shipments which have not used guaranteed traffic. This section will analyze this question in several ways.

The first general procedure will examine the qualitative effect of guaranteed traffic upon rates, while holding other effects constant, by conducting analyses of variance upon data obtained from all DLA depots. The second general procedure will examine the qualitative effects of guaranteed traffic upon rates by fitting a quadratic regression function to rate changes over time.

A. Data

All shipments weighing over 200 pounds and moving under government bills of lading by motor carrier in van type equipment from the six DLA depots to continental U.S. destinations from 1 October 1981 until 30 September 1984 were obtained. Shipments

under 200 pounds were deleted since the Guaranteed Traffic Program has had little, if any, effect on small shipment rates and service. Each observation consisted of the rate at which the shipment moved, the originating depot, shipment dates, load type (truckload or less than truckload), and other information. In order to observe changes in rates, the three years were broken down into six-month periods. Since the Guaranteed Traffic Program was introduced over time at various depots, some depots and load types used guaranteed traffic over all six periods, some used it over only some of the periods, and some did not use it at all. To account for changes is general price levels over this time, the rates per hundredweight for all shipments, both truckload and less than truckload, were adjusted by using the deflator for government transportation purchases published in the Survey of Current Business (U. S. Department of Commerce).

B. Analysis

The first question addressed is whether there is a difference in rates for shipments using or not using guaranteed traffic while holding constant all other influences. This question can be answered by using analysis of variance techniques (Neter, Wasserman, and Kutner). The dependent variable in the analyses of variance is the real or deflated rate per hundredweight. Independent variables or factors are the degree of guaranteed traffic experienced (all, partial, or none), the type of load of the individual shipment (less than truckload or

truckload), and the time period of the shipment (1-6). Depots do not appear as factors since this information is contained in the degree of guaranteed traffic.

The statistical hypothesis to be tested is that, when all other factors are controlled, the degree of guaranteed traffic significantly affects rates. Conforming to standard statistical practice, this hypothesis will be the alternate hypothesis, and the null hypothesis will be that the degree of guaranteed traffic has no significant effect upon rates. Preliminary analyses indicated that, although rate effects are highly significant, interaction effects between the degree of guaranteed traffic and time period are also significant. This is expected since the partial guaranteed traffic case confounds both of these separate factors. Therefore, all cases of partial guaranteed traffic were deleted from the analysis so that only two degrees of guaranteed traffic remained: all or none. Recall that no guaranteed traffic indicates that the shipments moved under tender or SRO rates.

The results of this analysis of variance (ANOVA) are shown in Table 1. Standard column headings are used: the source of the variation which is being analyzed, the sum of squares due to that source, the degrees of freedom of that source, the F-statistic value which tests the null hypothesis of no effects on the dependent variable due to that source, and the p-value or significance value of the previous F-statistic. The analysis indicates that while holding constant the time period (Period)

and load type (Load), guaranteed traffic (GTP) has produced significantly different rates than tender or SRO traffic. This is shown by the F-statistic value of 180 which corresponds to a p-value of 0.000. This may be interpreted as meaning that there is a very small probability, less than 0.000, that rates under guaranteed traffic are the same as rates under tenders or SRO's. The guaranteed traffic rates are significantly lower as can be discerned from confidence interval analyses of the ANOVA, which are not included here, and as will be shown next.

Table 1 about here.

Table 1 indicates that mean rates in the six time periods are significantly different. This is shown by the F-statistic value of 109 which corresponds to a p-value of 0.000. Analysis of the raw data shows that, at each depot and for each load type, rates fell and then increased over the six periods. Confidence interval analyses, again not included here, show that there is a significant difference between the higher rates of the beginning and ending periods and the lower rates of the middle periods. This conclusion indicates that a quantitative analysis of rate changes over time is necessary.

The following analysis will quantitatively model rate changes over time in order to determine if guaranteed traffic rates have resulted in lower increases than tender or SRO rates from the middle periods to the ending periods. To model these

rate changes over time, a quadratic function of time is used. The dependent variable, y, is the mean rate observed during each time period for each load type at each DLA depot. The independent variable, t, is the time period value (1-6). The following equation is fitted for each load type and each depot:

$$y = b_0 + b_1 t + b_2 t^2.$$

The resulting twelve equations can be classified into all, partial, or no guaranteed traffic over the time periods of the study, as is shown in Table 2. Three of these equations fit very poorly and were discarded from further analysis. Using the remaining nine equations, estimated increases in rates are calculated from the quadratic equations by determining the minimum and ending rates from the fitted equation. Comparing these estimated increases with the actual, observed increases indicates that the estimated means for the three categories slightly understate observed means. Table 2 also shows that there are smaller increases in rates for those shipments at depots using all or partial guaranteed traffic than for shipments at depots having no guaranteed traffic program.

Table 2 about here.

These data can be used to test the hypothesis that estimated and observed increases in rates are significantly lower for all guaranteed traffic shipments than for no guaranteed traffic shipments. Application of several standard parametric (t-test

for all GT versus none; one-way ANOVA for the three GT categories) and nonparametric (Mann-Whitney; Kruskal-Wallis) tests yielded significance values at or slightly above the standard rejection point of 0.10. This appears to have occurred because the use of rate means destroys most of the individual rate variations which demonstrated the very strong rate effect in Table 1.

Hence, the conclusion is that, although there are no extremely strong statistically significant differences in estimated or observed changes in rate means over these time periods, such differences do exist. Further regression analysis using individual shipment rates during each time period instead of rate means should exhibit the strong, statistically significant differences shown in the analysis of variance of Table 1.

V. Guaranteed Traffic and Service Quality

The above analyses have concentrated solely on the rate effects of the Guaranteed Traffic Program. However, service quality effects are also important, since if the lower rates shown above have resulted in poorer service then the program has not been a total success. Service quality, as measured by transit time, at one of the depots using guaranteed traffic has been examined (Myers). That analysis showed that transit times, adjusted for length of haul, for less than truckload shipments

exhibited a statistically significant decline over the three year period, while transit times for truckload shipments exhibited a slight, non-statistically significant increase. Although Myers' analysis is limited, it does provide an indication that service quality, as measured by transit times, is not significantly poorer because of the Guaranteed Traffic Program.

V. CONCLUSIONS

Following the partial deregulation of the motor carrier industry after passage of the Motor Carrier Act of 1980, the Defense Logistics Agency introduced the Guaranteed Traffic Program. This program is designed to allow competitive bidding among interested motor carriers for large quantities of shipments at selected DLA depots. After statistically controlling for recessionary effects occurring over the same time, this analysis has shown that increased competition among motor carriers through the use of DLA's Guaranteed Traffic Program has resulted in significantly lower rates than similar traffic not using the Guaranteed Traffic Program. Hence, increased competition among motor carriers appears to be generating the decline in rates predicted by deregulatory advocates prior to the passage of the Motor Carrier Act of 1980, while not significantly deteriorating service quality.

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TABLE 1

Analysis of Variance of Rates:

GTP by Period by Load

Source of Variation	Sum of Squares	df	F-stat	P-value
Factor A (GTP)	32328.	1	180.	0.000
Factor B (Period)	98390.	5	109.	0.000
Factor C (Load)	2033143.	1	11355.	0.000
AB Interaction	33794.	5	37.	0.000
AC Interaction	15873.	1	88.	0.000
BC Interaction	22845.	5	25.	0.000
ABC Interaction	28969.	5	32.	0.000
Error	47234248.	263803		

TABLE 2

Estimated and Observed Rate Increases From

Minimum Rate Point to Period Six

Group	Depot/Load	Estimated Increase	Mean	Observed Increase	Mean
All GT	Tracy (LTL)	16.5%		29.7%	
	Tracy (TL)	14.5%	12.2%	23.6%	15.9%
	Memphis (TL)	5.7%		3.4%	
Part GT	*Columbus (LTL)	---		---	
	Columbus (TL)	26.2%		31.0%	
	Mech'burg (LTL)	11.5%	16.4%	12.1%	21.5%
	Mech'burg (TL)	5.7%		19.2%	
	Richmond (TL)	22.2%		23.7%	
No GT	Memphis (LTL)	15.8%		19.4%	
	Ogden (LTL)	30.7%	23.3%	74.8%	47.1%
	*Ogden (TL)	---		---	
	*Richmond (LTL)	---		---	

*Denotes depots not considered in analysis due to poor fits.

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